Cultural and economic benefits of green retrofits

Recognizable cultural benefits create economic benefits.

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Would I want to live there?
Would someone else want to live there?

Would I want my child to work there?

Is someone taking care of this?

Cues to care

Nassauer, J. I. 1995. Messy Ecosystems, Orderly Frames. **Landscape Journal**. 14:2, pp. 161-170.

Messy ecosystems require orderly frames: cues to care

Order: conventional landscape

Cues to care: prairie garden

Messy: mistaken for neglect

Nassauer. 1993. Ecological Function and the Perception of Suburban Residential Landscapes. In Gobster, P.H., ed., **Managing Urban and High Use Recreation Settings**, General Technical Report,USDA Forest Service NCF Exp. Sta., St. Paul, MN. USDA FS Grant 1989.

Simulations by Fred Rozumalski

The Economics of Native Plants in Residential Landscape Designs
Landscape and Urban Planning 2005 (in press)
Gloria E. Helfand, Joon Sik Park, Joan I. Nassauer, Sandra Kosek

2000 web-based survey of
245 homeowners and tenants planning to buy a house within 5 years.

They were willing to pay more for each of the prairie garden designs compared with a conventional residential design.

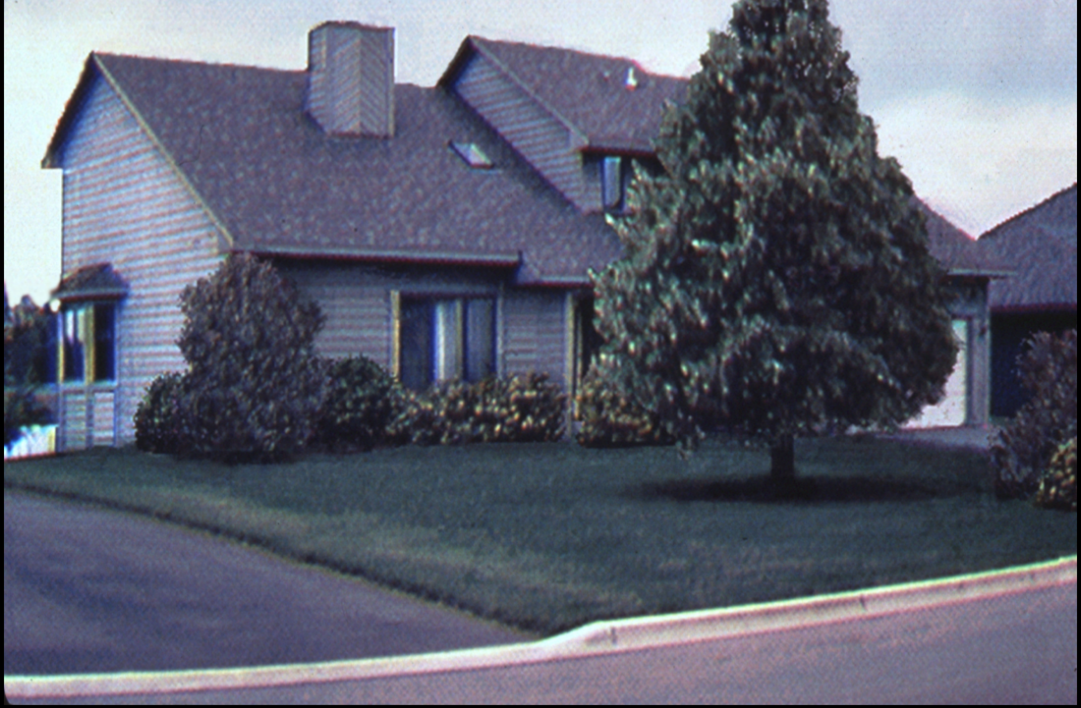
People are willing to pay a premium for prairie garden alternatives.

These yards include different amounts of lawn, prairie garden, shrubs, and trees. The lawn is turf grass. If the yard is only lawn, then the trees and shrubs are non-native. The lawn may take 6 months to one year to become established.

The prairie garden consists of wildflowers and grasses with native shrubs and trees. The prairie garden attracts more wildlife than the lawn. If the yard has a prairie garden the trees and shrubs are native plants. The prairie garden may take up to three years to become established.

Maintenance of the lawn includes annual pruning of the trees and shrubs, autumn raking, weekly mowing of the lawn, and yearly fertilization. Maintenance of the prairie garden includes mowing the prairie garden every few years.

Cost/mo/5 yr.	Typical lawn(A)	50% Prairie B	75% Prairie C	75% Shr/Pr D
Install range (turf)	$1,400-2,000	$1,400-2,000	$700-1,000*	$700-1,000*
Install range (prairie)	N/A	$2,880-3,000	$2,880-3,000	$3,180-3,300**
Maintenance range	$700-1,000	$1,000-$1,200	$700-1,000	$700-1,000
Min. total cost, 5 years	$4,900	$9,280	$7,080	$7,380
Min. average monthly cost over 5 years	$82	$155	$118	$123
Max. total cost, 5 years	$7,000	$11,000	$9,000	$9,300
Max. average monthly cost over 5 years	$117	$183	$150	$155
Range used in survey	$75-130	135-190	110-158	$123-162



$75-130

$135-190

$110-158

$123-162

Simulations by
Sandra Kosek

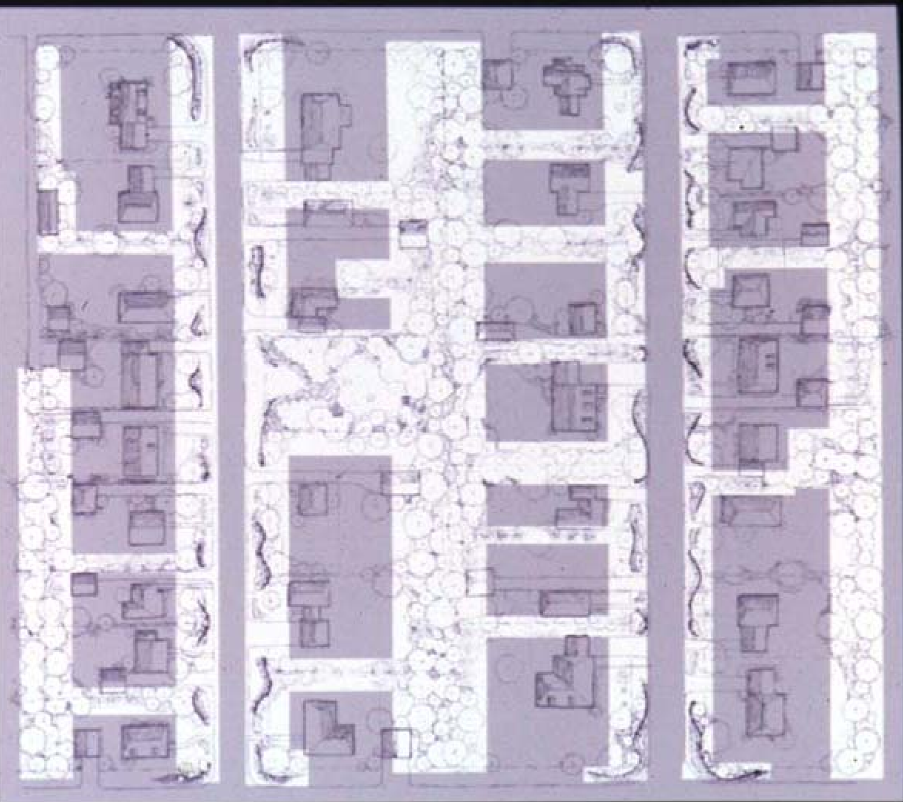
The WTP order for the yard types is 75%,50%,75% w/shrubs, conventional.

Net WTP for 75% prairie garden is highest - $126. - 138. more per month

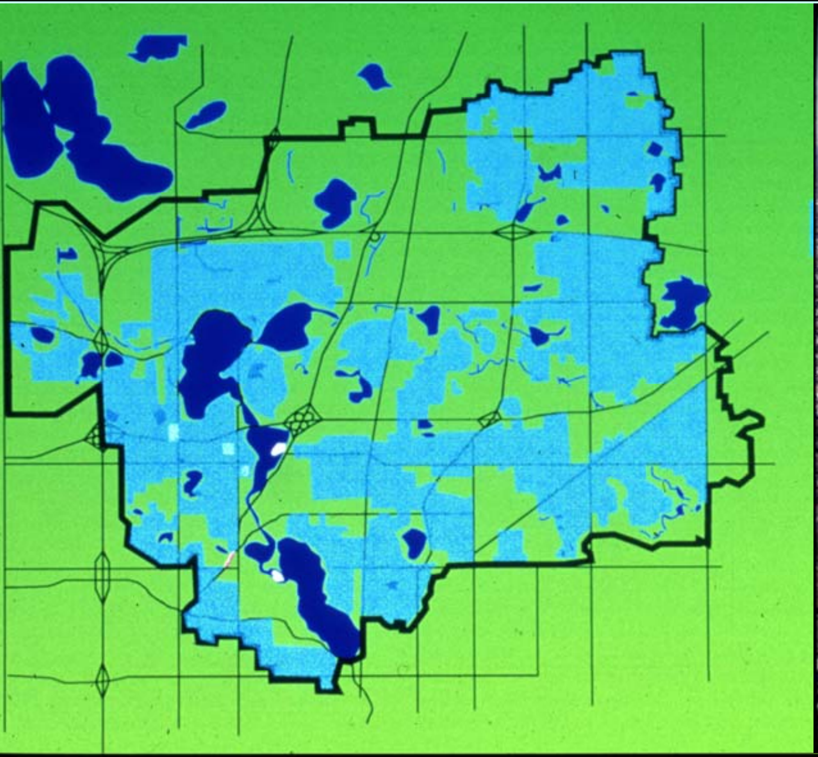
Net WTP for 50% prairie garden is $113. - 126. more per month

Retrofitting a 1950’s neighborhood: Maplewood Rainwater Gardens

City of Maplewood, MN 1995

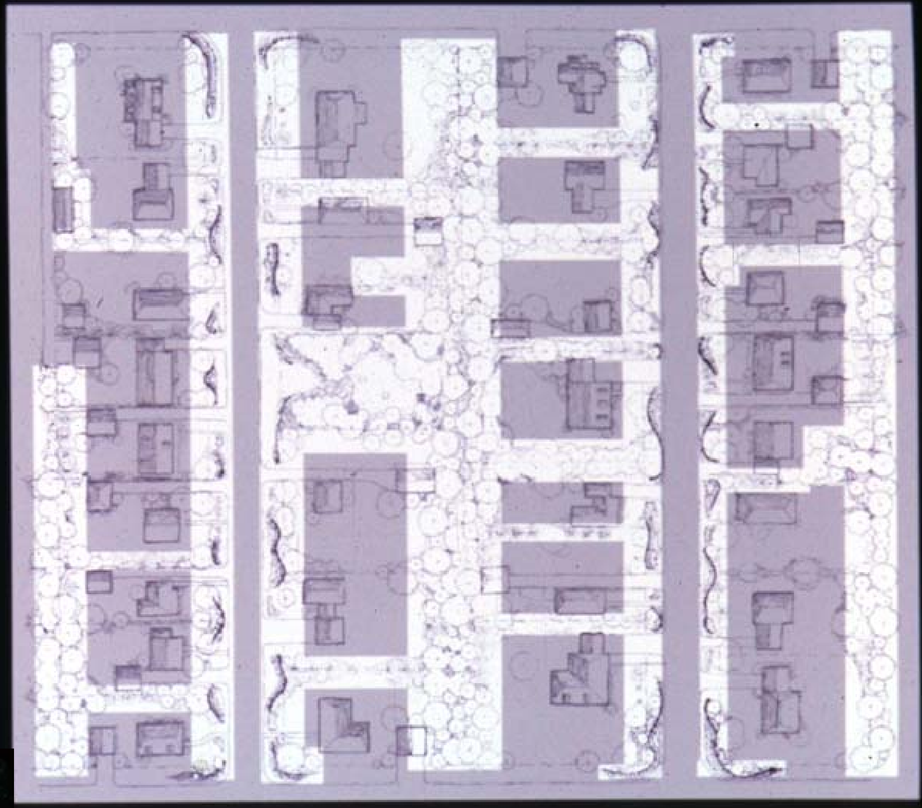


Nassauer, J.I. 1999. Ecological Retrofit. Landscape Journal. 17:2, pp.15-17.







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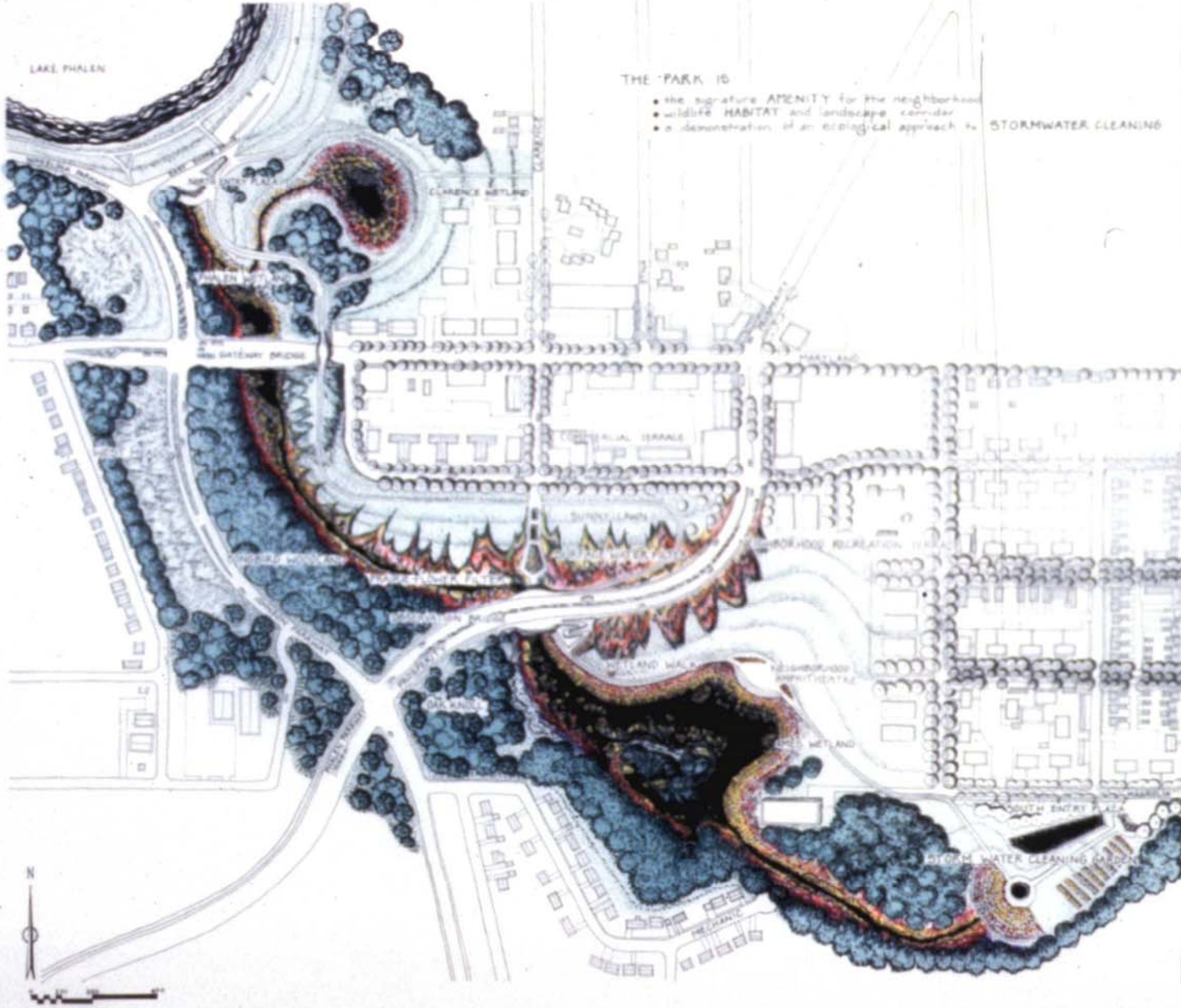

LAKE PHALEN
NORTH ENTRY PLAZA
CLARENCE WETLAND
GATEWAY BRIDGE
THE PARK IS
• the signature AMENITY for the neighborhood
• wildlife HABITAT and landscape corridor
• a demonstration of an ecological approach to STORMWATER CLEANING
MARYLAND
SUNNY LAWN
WETLAND WALK
NEIGHBORHOOD AMPHITHEATRE
WETLAND
SOUTH ENTRY PLAZA
N
FEET

WETLAND WALK

AIRIE FLOWER FILTER

Drawings by
Ross Martin


I see the nature.
I hear the wind blowing.
I small food and fresh air.
I touch branch and fool around.
I taste the food and fresh water, and also the air.
Pa Vue
me
mother
baby
my mom

Phalen Wetland Park – site of Bruce Vento Memorial Grove
City of St. Paul 1996

People and wildlife immediately began to use the park…

Nassauer. 2004. Monitoring the success of metropolitan wetland restorations: cultural sustainability and ecological function. **Wetlands** 24:4. pp. 756-765**.**

BCI – Minnesota – Phalen Corridor Initiative


LAKE PHALEN
CLARENCE WETLAND
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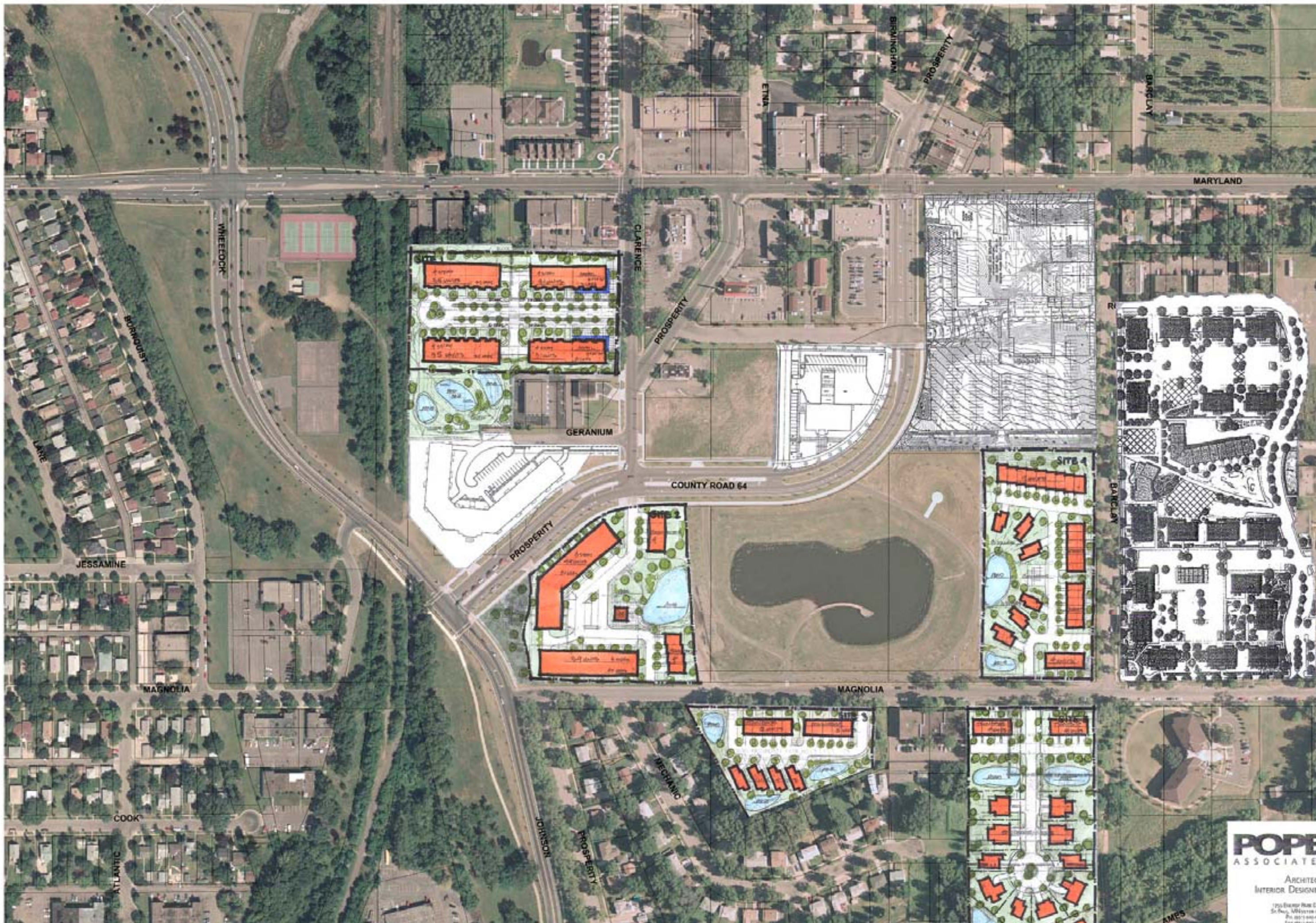
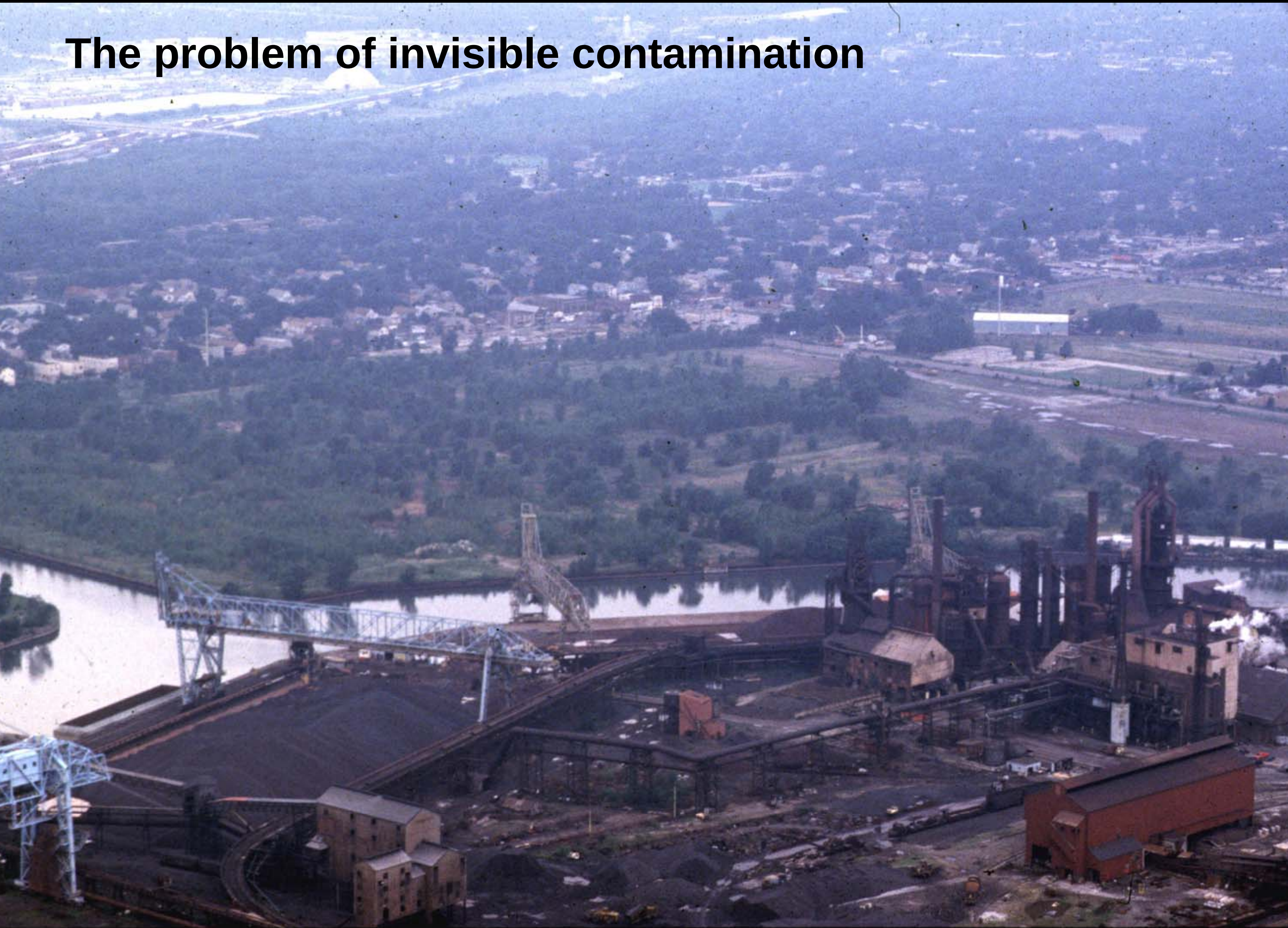

BIRMINGHAM
PROSPERITY
ETNA
BARCLAY
MARYLAND
WHEELOCK
CLARENCE
PROSPERITY
BOURQUEST
LARK
GERANIUM
COUNTY ROAD 64
SITE 1
SITE 2
BARCLAY
PROSPERITY
JESSAMINE
MAGNOLIA
MAGNOLIA
SITE 3
SITE 4
MECHANIC
COOK
ATLANTIC
JOHNSON
PROSPERITY
POPE
ASSOCIATES
ARCHITECTS
INTERIOR DESIGNERS

Gasworks Park, Seattle, Rich Haag.

What looks orderly and inviting, can hold residual contamination…..

The problem of invisible contamination



Abandoned contaminated sites can look like and function as habitat. A precautionary approach would limit wildlife contact.

Contaminated lands:

remediation and brownfield redevelopment should employ the precautionary principle:

Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.

Principle 15 of the Rio Declaration on Environment and Development, UN Conference on Environment and Development,1992.

The fence connotes danger – and the land beyond it is contaminated

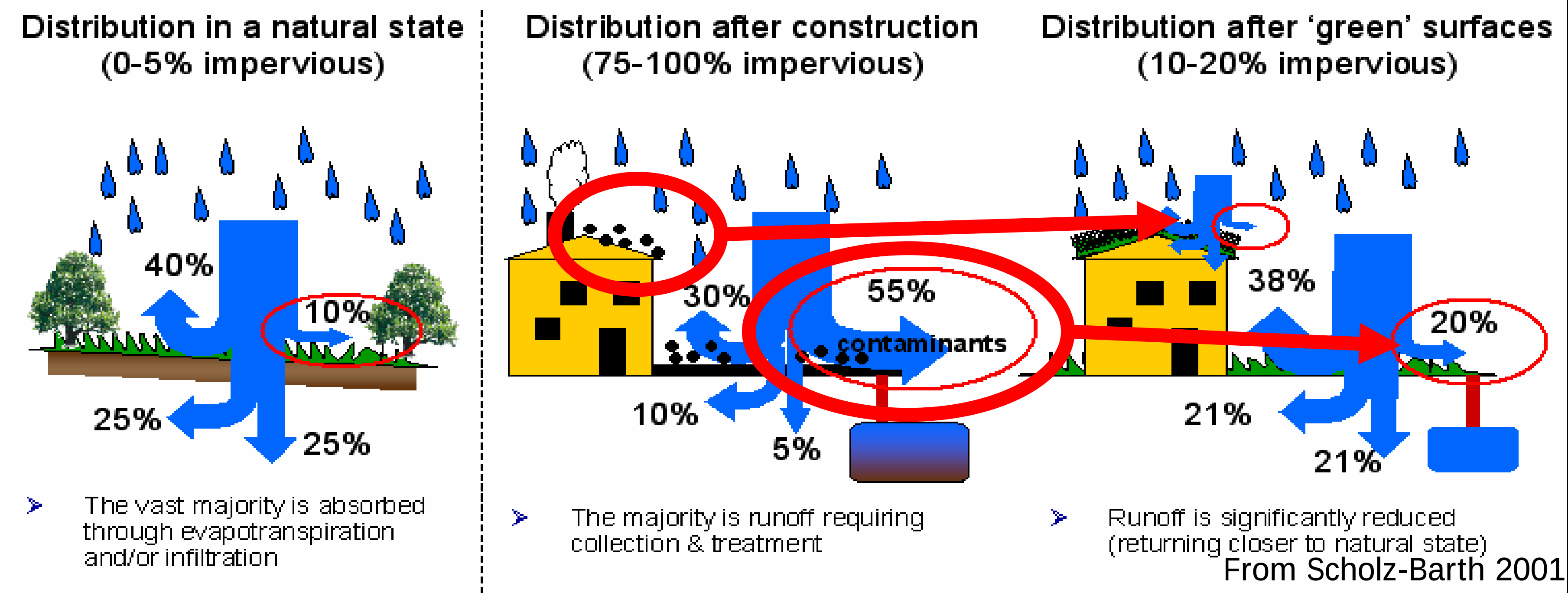
A precautionary approach to residual contamination on a remediated site might limit access by people and wildlife.

Brownfield redevelopment:
the precautionary principle and cues to care

Cues to care and residual contamination without precaution

Traditional and residual with precaution

Green technologies and pervasive contamination



From Scholz-Barth 2001

Planned Vision for Ford Rouge Center-- Illustration: Richard Rochon

When contamination is pervasive, even green roofs, pervious paving, and rainwater gardens may inadvertently concentrate diffuse contaminants.

Would a more highly engineered order track and manage the fate of contaminants?

Would it more effectively “cue” safer human and wildlife use?

Principles for Ecological Landscape Design in Brownfield Business Parks

Part of USDA Forest Service research project # 00-JV-11231300-033:
Aligning Social and Ecological Drivers of Urban Landscape Change

Joan Iverson Nassauer, Alejandra Chiesa, and Robert C. Corry
School of Natural Resources & Environment, University of Michigan

Note: All images that appear in this document are computer imaging simulations.

Principle 1: CONNECTION

Corollary 1.1. LARGE HABITAT PATCHES

Brownfield redevelopment designs should create large habitat patches on clean areas, especially where these clean areas are connected or near off-site habitat patches or corridors, including streams, wetlands, woodlands, or other indigenous ecosystems.

Figure 1. This large habitat patch is located to expand on existing habitats adjacent to the brownfield sites. It has been constructed on clean soils, and separated from possibly contaminated groundwater by a perched water table. Formerly contaminated soils occur in the area of mown turf to the right.

This principle requires examining the landscape context of the brownfield site to identify larger regional habitat patches and corridors and to identify adjacent patches or corridors that may be locally important. Where soil and water have not been contaminated, habitat patches can be created. New habitat patches are particularly desirable where they would enlarge or connect existing habitats. However, where connecting to or creating large habitat patches could bring wildlife in contact with water or plants that contain contaminants, the precautionary principle (see Principle 2) would suggest erring on the side of creating **less habitat** to discourage wildlife from using possibly contaminated areas as habitat rather than risking uptake of contaminants by wildlife or the transport of contaminants by plants or animals.

Principle 1: CONNECTION

Corollary 1.3. CO-LOCATION OF INDUSTRIES

Brownfield redevelopment designs should create opportunities for industries to exchange materials and energy by infrastructure designs that allow for industries that could exchange materials or energy to be clustered together.

Figure 3. The concentration of industries in the buildings shown could allow waste energy or material by-products of one industry to be used by other industries located nearby. While this design doesn't facilitate flows of species within the riparian corridor, it does prevent pollution by facilitating flows of industrial by-products. If soils or groundwater near the stream retain possible contamination, discouraging flows between the riparian area and the stream may be the most ecologically beneficial design (see Principle 2).

This important idea from industrial ecology prevents pollution and reduces demand for reused energy or materials. It also encourages industries that exchange materials and energy and minimize transportation costs to be clustered in a concentrated area.

Principle 2: SEPARATION

Corollary 2.1. CLEAN STORM WATER AND CONTAMINATED GROUND WATER

Brownfield redevelopment designs should detain storm water on the surface in areas where it could infiltrate to contact possibly contaminated groundwater.

Figure 4. The impervious paving of this parking lot could be located on possibly contaminated soils. The rainwater garden detention islands in the parking lot are designed with below-grade barriers to separate storm water from contact with possibly contaminated soils and ground water.

This approach to storm water management is intended to keep storm water clean after it falls on roof tops or clean areas of business parks. Paving, rooftops, or a below-grade barrier that creates a perched water table can separate storm water from ground water. Surface detention also encourages evapotranspiration back to the atmosphere and movement to local streams or wetlands. Roof run-off may be cleaner than surface water run-off from roads and parking lots, so a three-tier system of storm water detention (roofs, roads, and ground water) that directs roof run-off to habitat areas but keeps road run-off separate from possibly contaminated ground water may be ideal.

Principle 2: SEPARATION

Corollary 2.2. PAVING, TURF, AND HABITAT

Both paving and mown turf discourage wildlife from using an area as habitat. In areas where contamination may remain, paving or turf may be the most ecologically beneficial land cover.

Figure 5. While this area has been remediated for commercial and industrial uses, shallow-rooted turf and paving discourage movement of remaining contaminants to the surface.

Carefully choose plants to discourage wildlife in areas that could continue to have low levels of contamination. Avoid toxic effects on wildlife or pets and animals becoming vectors for contaminants. Non-turf vegetation that could attract wildlife may not be appropriate for areas that contain even low levels of contamination; impervious surfaces (parking or buildings sealed from contaminants) may be more suitable for such areas. In addition, mown turf or impervious surfaces can be used to separate "clean" larger habitats from less clean areas and discourage movement of wildlife into low level contamination areas (see Corollaries 1.1 and 1.2).

Concentrations of buildings and paved surfaces that are often needed for co-location or for large manufacturing industries may be appropriately located where contaminants must be sealed below ground. For low level contamination areas, impervious surfaces of paving and buildings may be more appropriate choices than natural-looking patches, which can attract people, pets, and wildlife (see Corollary 1.3).

Figure 8. The design and maintenance of habitat and non-habitat patches should make the amenity value of the landscape immediately apparent. This building facade and entry are framed with mown turf over half the area. Habitat patches include flowering plants and crisp, clearly defined edges.

Figure 9. The unpaved area here is entirely indigenous plants. Making one-half of the unpaved area mown turf would demonstrate good care.

Corollary 3.1: VISIBLE MOWN TURF

Mown turf should be visible from the road, from the parking lot, and leading to the entrance of the business. Mown turf should occupy at least 50% of the front of the unpaved areas of the business site and at least 25% of the back of the unpaved area of the business site.

For some businesses, mown turf may be necessary in additional locations for business reasons. For example, some food industries may require mown turf in a zone around buildings to discourage entry to the building by animal pests.

Corollary 3.2 : FLOWERS AND TREES

Flowering plants, and trees should dominate patches that are not mown turf.

Flowering trees and other plants are most widely perceived as attractive and are more likely to be associated with good care.

Figure 10. The design and maintenance of habitat and non-habitat patches should make the amenity value of the landscape immediately apparent. This building facade and entry are framed with mown turf, and indigenous plants are chosen for their amenity and ecosystem values.

Figure 11. Indigenous plants should be chosen to contribute to the appearance of care and order. Plants of some ecosystems, like Great Lakes alvars, may be difficult to design to achieve this appearance.

Corollary 3.3: ENTRY VIEWS

Design non-turf patches to frame the entry view to the building façade and entrance from roads and parking lots.

Turf or low-growing plants can lead the eye to the entry from the street or parking lot.

Corollary 3.4: CRISP EDGES

Design crisp, clearly defined edges between turf patches and non-turf patches.

Crisp edges also convey good care. They can be achieved by a continuous mown edge or be structural materials, like pavers or fences.

Corollary 3.5: NATURAL VERSUS INDIGENOUS ECOSYSTEM

Not all indigenous ecosystems are equally amenable to being designed to be perceived as amenity landscapes. Prairie, savanna, and stream may be most easily adapted to brownfield redevelopment designs where habitat is desirable. Wetland ecosystems also can be designed to create amenity. While Great Lakes alvar ecosystems make strong ecological analogues to some well-drained, highly alkaline brownfield sites, they may be more difficult to design for amenity values, particularly on smaller sites.

Green retrofits CAN reflect cultural values that build market values. HOW green retrofits enhance habitat and stormwater functions must acknowledge residual contamination and incidental hydrologic regimes.